NASA SBIR/STTR Technologies

Programmable High-rate Multi-Mission Receiver for Space Communications, Phase 2
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Identification and Significance of Innovation

NASA space links require both highly reliable low-rate communications links as well as highly efficient high-data rate links to ensure the success of a mission. By investing in re-usable elements, such as Programmable Communications Radios, for ground and flight data handling that are capable of receiving both types of links addresses current Comm/Nav needs without foregoing future capabilities. Current receiver designs typically address either high-rate or low-rate requirements but not both. Additionally a soft-radio can incorporate user-programmable firmware blocks as a Technology Incubator platform for R&D use. The proposed innovative High-Rate Receiver Backbone (HRRB) supports this R&D use and provides a foundation for a Programmable High-rate Multi-mission Receiver (PHMR) for low- and high-rate operational needs.

The significance of the HRRB/PMHR is that it will 1) provide an implementation for wide bit-rate support of CCSDS and related modulations, 2) provide commonality between different missions, link types, spares pools, and maintenance/training tasks, and 3) establish a digital radio Technology Incubator platform for use in signal processing and coding R&D.

Technical Objectives

:: Develop/implement an IF front end, refine/extend ADC/DAC performance
:: Add user-programmable coding logic blocks, add I/O for external processing
:: Expand Transmit platform to support new Receiver functionality, review architecture
:: Produce an HRRB, test with available Modulators, and deliver to NASA
:: Evaluate market(s) and implement productization and commercialization activities

Work Plan

:: Implement and construct a Transmit Support Platform (TSP)
- Waveform creation, shaping, coding, and test signal generation
:: Implement and construct a deliverable High-Rate Receiver Backbone (HRRB)
- IF conditioning, signal digitization, demod and decode, user programming blocks
:: Implement and code a PC Development Platform (PDP)
- GUI for configuration, test control, result analysis, and user FPGA tools
:: Refine market analysis and commercialization activities
- ID specific programs, detail sales/promotion plans, research Synthetic Instrumentation and Launch/Range potential.

NASA Applications

Low-Rate TT&C, Ranging and Voice Services; High-Rate Mission Data Return Links; Nav and Comm Links; Range Upgrade and Modernization Efforts; Upcoming ORS initiatives; MR and LR links; Antenna Arrays; Space Platforms; SoC ahd Highly-Integrated Electronics; modulation/coding R&D

Non-NASA Applications

DoD ISCN; DoD TSAT/FCS/GIG; commercial networks such as USN, DataLynx, Orbimage, DigitalGlobe; UAVs; launch/range initiatives; other satellite agencies, contractors, and providers, Synthetic instrumentation requiring a high-speed, low-noise ADC platform

Firm Contacts

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NON-PROPRIETARY DATA